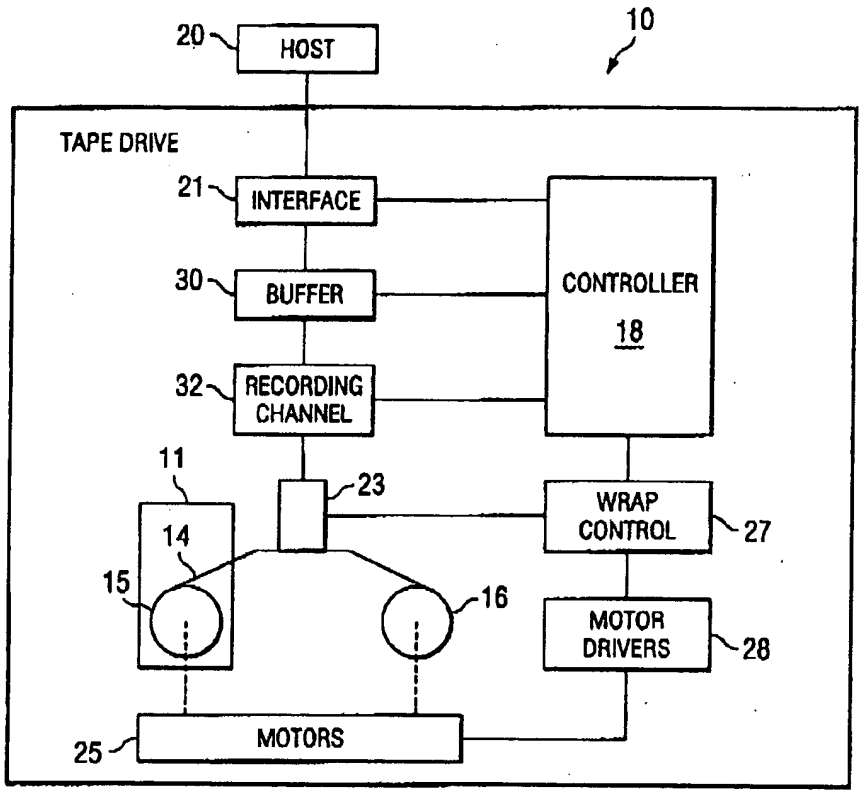
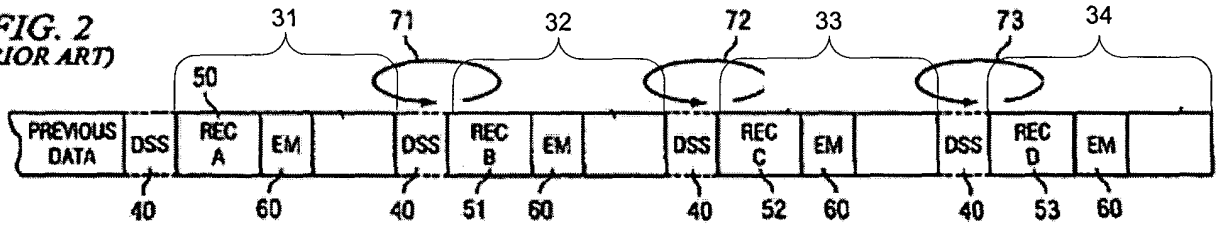

20
HOST
10
TAPE DRIVE
21
INTERFACE
30
BUFFER
32
RECORDING CHANNEL
CONTROLLER
18
11
23
WRAP CONTROL
27
14
15
16
MOTOR DRIVERS
28
25
MOTORS

FIG. 1

FIG. 2
(PRIOR ART)



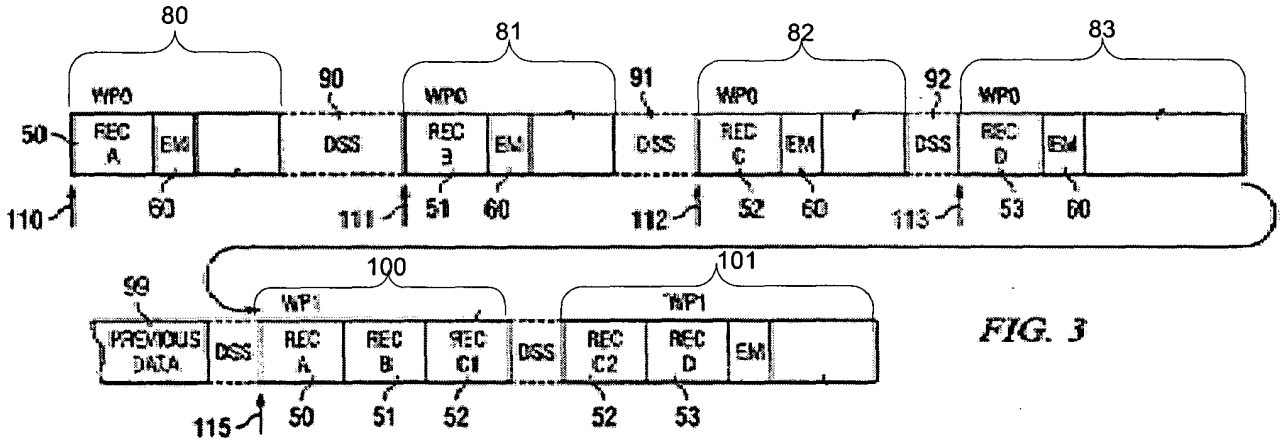


FIG. 3

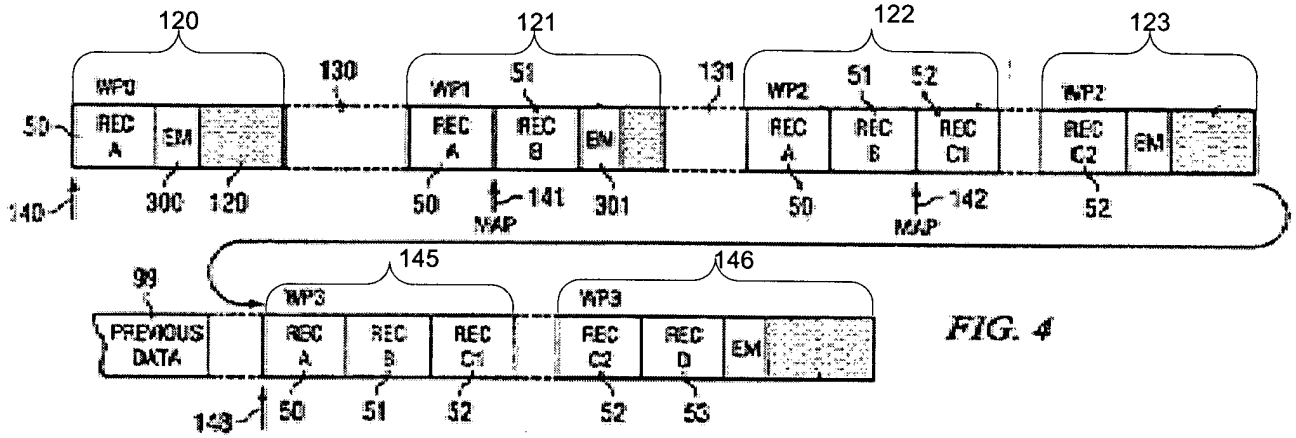

120
121
122
123
130
131
WP0
WP1
WP2
WP2
REC A
EM
REC A
REC B
EM
REC A
REC B
REC C1
REC C2
EM
50
51
52
140
300
120
50
141
MAP
301
50
142
MAP
52
145
146
99
WP3
WP3
PREVIOUS DATA
REC A
REC B
REC C1
REC C2
REC D
EM
143
50
51
52
52
53

FIG. 4

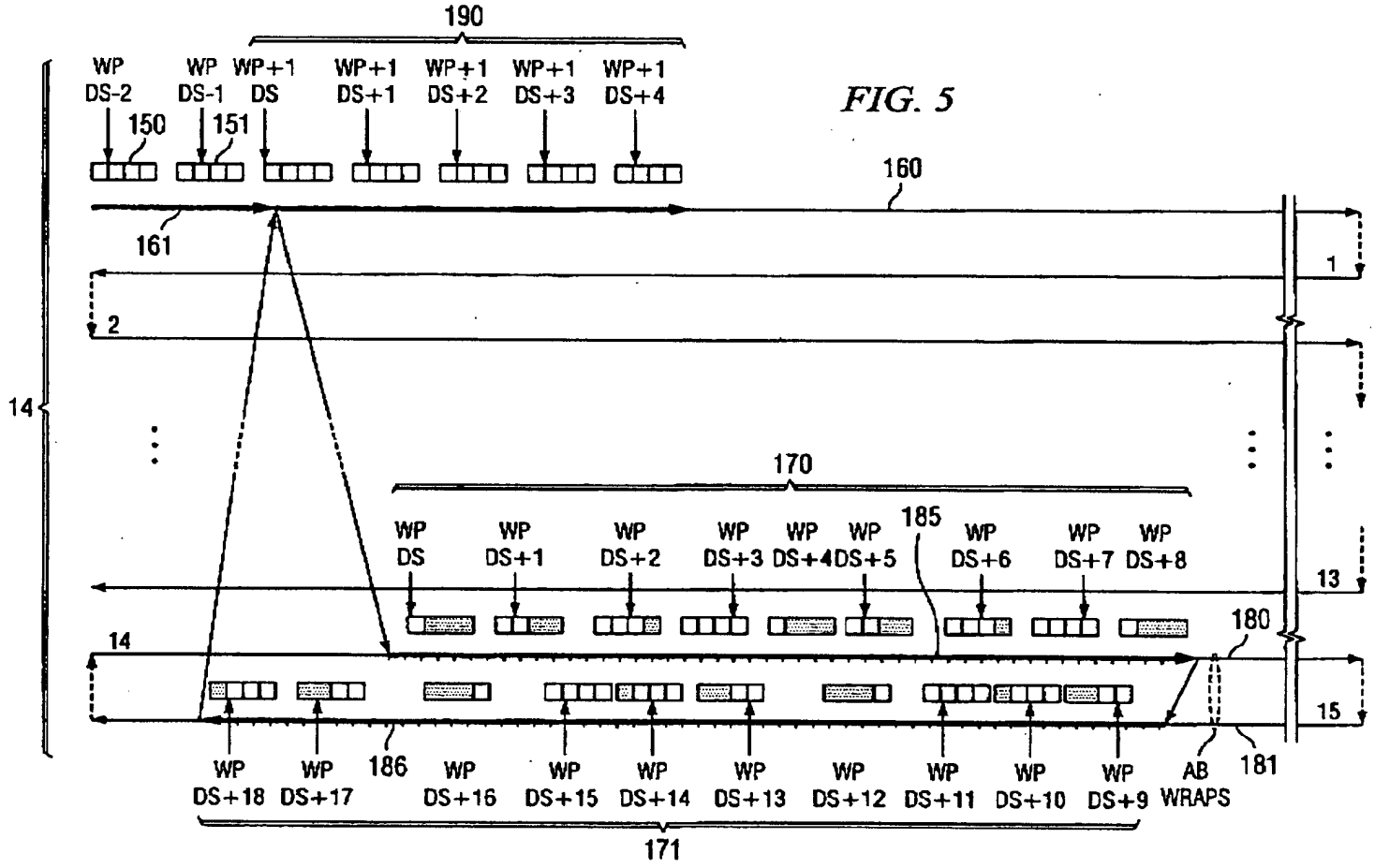

190
WP DS-2
WP DS-1
WP+1 DS
WP+1 DS+1
WP+1 DS+2
WP+1 DS+3
WP+1 DS+4
150
151
160
161
1
2
14
170
185
WP DS
WP DS+1
WP DS+2
WP DS+3
WP DS+4
WP DS+5
WP DS+6
WP DS+7
WP DS+8
13
180
14
15
WP DS+18
WP DS+17
186
WP DS+16
WP DS+15
WP DS+14
WP DS+13
WP DS+12
WP DS+11
WP DS+10
WP DS+9
AB WRAPS
181
171

FIG. 5

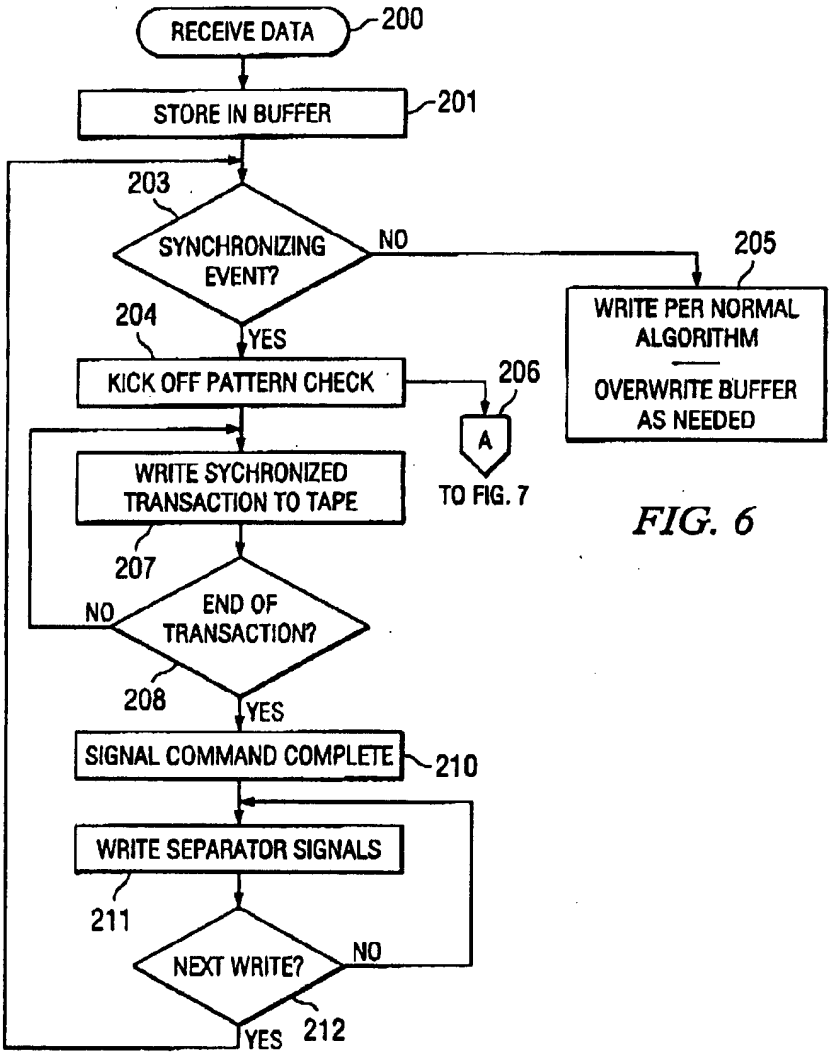

RECEIVE DATA
200
STORE IN BUFFER
201
203
SYNCHRONIZING EVENT?
NO
205
WRITE PER NORMAL ALGORITHM
OVERWRITE BUFFER AS NEEDED
204
YES
KICK OFF PATTERN CHECK
206
A
TO FIG. 7
WRITE SYCHRONIZED TRANSACTION TO TAPE
207
NO
END OF TRANSACTION?
208
YES
SIGNAL COMMAND COMPLETE
210
WRITE SEPARATOR SIGNALS
211
NEXT WRITE?
NO
YES
212

FIG. 6

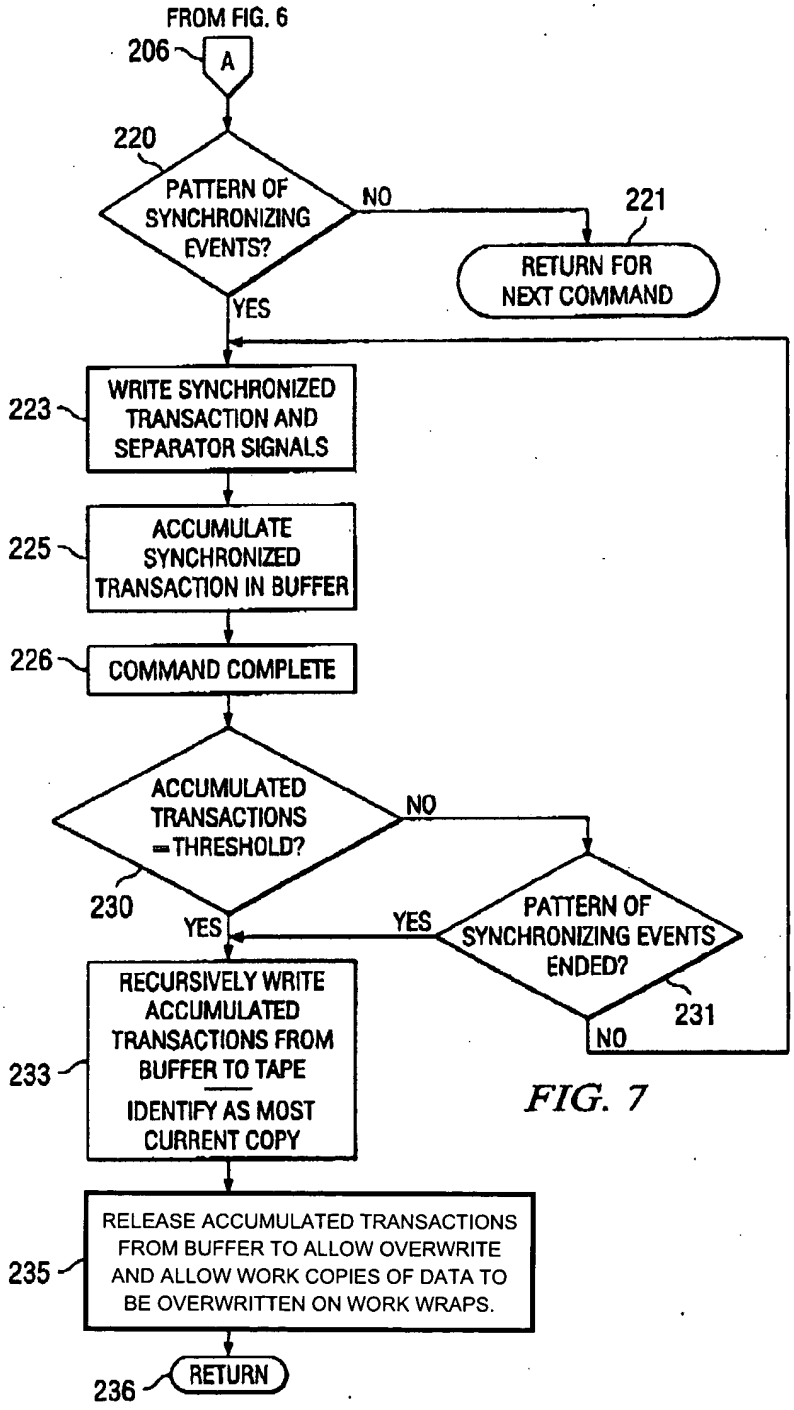

FROM FIG. 6
206
A
220
PATTERN OF SYNCHRONIZING EVENTS?
NO
221
RETURN FOR NEXT COMMAND
YES
223
WRITE SYNCHRONIZED TRANSACTION AND SEPARATOR SIGNALS
225
ACCUMULATE SYNCHRONIZED TRANSACTION IN BUFFER
226
COMMAND COMPLETE
ACCUMULATED TRANSACTIONS =THRESHOLD?
NO
230
YES
YES
PATTERN OF SYNCHRONIZING EVENTS ENDED?
231
NO
233
RECURSIVELY WRITE ACCUMULATED TRANSACTIONS FROM BUFFER TO TAPE
IDENTIFY AS MOST CURRENT COPY
235
RELEASE ACCUMULATED TRANSACTIONS FROM BUFFER TO ALLOW OVERWRITE AND ALLOW WORK COPIES OF DATA TO BE OVERWRITTEN ON WORK WRAPS.
236
RETURN

FIG. 7

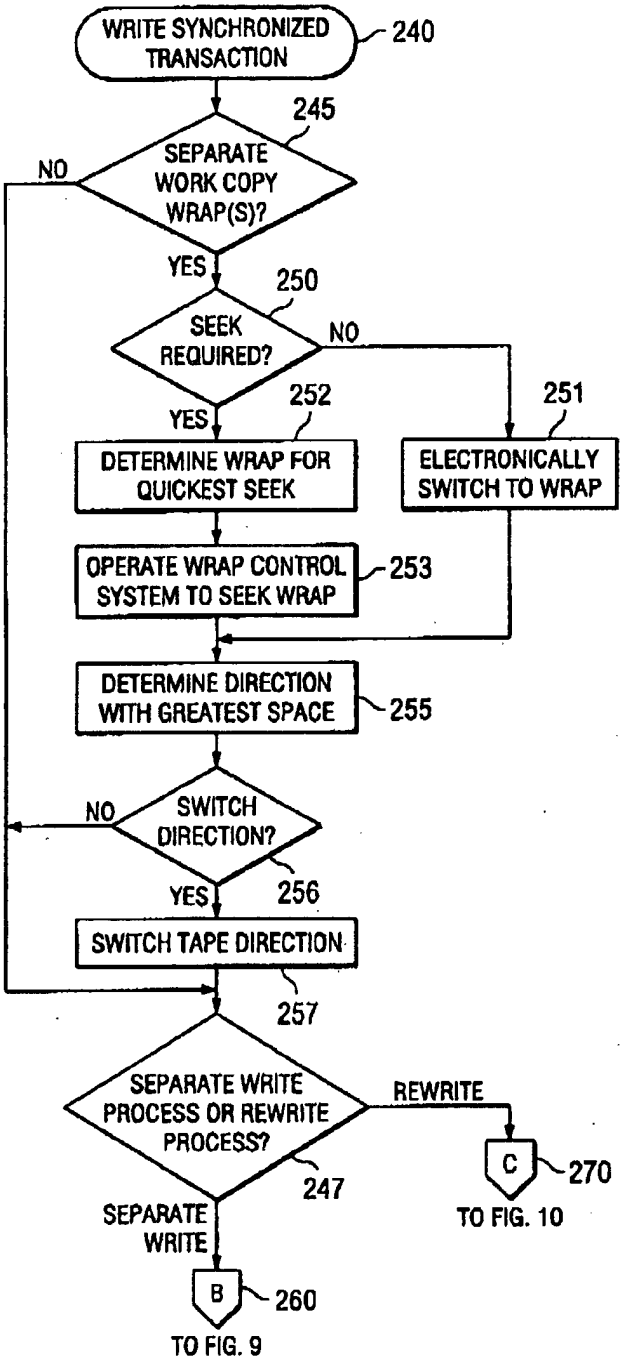

WRITE SYNCHRONIZED TRANSACTION
240
245
SEPARATE WORK COPY WRAP(S)?
NO
YES
250
SEEK REQUIRED?
NO
YES
252
DETERMINE WRAP FOR QUICKEST SEEK
251
ELECTRONICALLY SWITCH TO WRAP
OPERATE WRAP CONTROL SYSTEM TO SEEK WRAP
253
DETERMINE DIRECTION WITH GREATEST SPACE
255
NO
SWITCH DIRECTION?
YES
256
SWITCH TAPE DIRECTION
257
SEPARATE WRITE PROCESS OR REWRITE PROCESS?
247
REWRITE
C
270
TO FIG. 10
SEPARATE WRITE
B
260
TO FIG. 9

FIG. 8

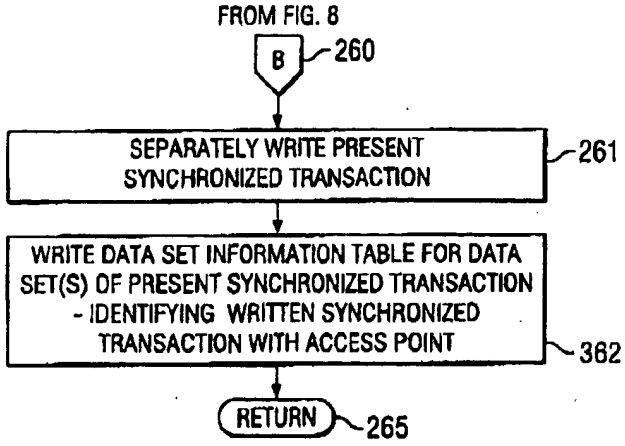

FROM FIG. 8
B
260
SEPARATELY WRITE PRESENT SYNCHRONIZED TRANSACTION
261
WRITE DATA SET INFORMATION TABLE FOR DATA SET(S) OF PRESENT SYNCHRONIZED TRANSACTION - IDENTIFYING WRITTEN SYNCHRONIZED TRANSACTION WITH ACCESS POINT
362
RETURN
265

FIG. 9

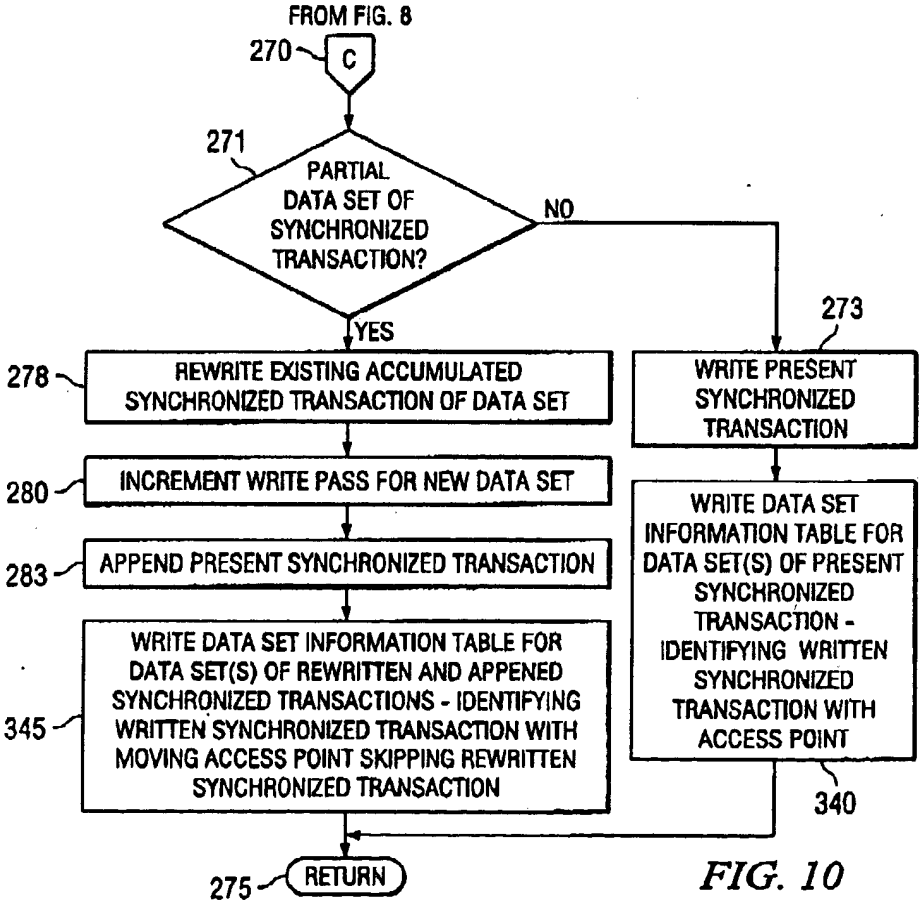

FROM FIG. 8
270
C
271
PARTIAL DATA SET OF SYNCHRONIZED TRANSACTION?
NO
YES
273
278
REWRITE EXISTING ACCUMULATED SYNCHRONIZED TRANSACTION OF DATA SET
WRITE PRESENT SYNCHRONIZED TRANSACTION
280
INCREMENT WRITE PASS FOR NEW DATA SET
283
APPEND PRESENT SYNCHRONIZED TRANSACTION
345
WRITE DATA SET INFORMATION TABLE FOR DATA SET(S) OF REWRITTEN AND APPENED SYNCHRONIZED TRANSACTIONS - IDENTIFYING WRITTEN SYNCHRONIZED TRANSACTION WITH MOVING ACCESS POINT SKIPPING REWRITTEN SYNCHRONIZED TRANSACTION
WRITE DATA SET INFORMATION TABLE FOR DATA SET(S) OF PRESENT SYNCHRONIZED TRANSACTION - IDENTIFYING WRITTEN SYNCHRONIZED TRANSACTION WITH ACCESS POINT
340
275
RETURN

FIG. 10

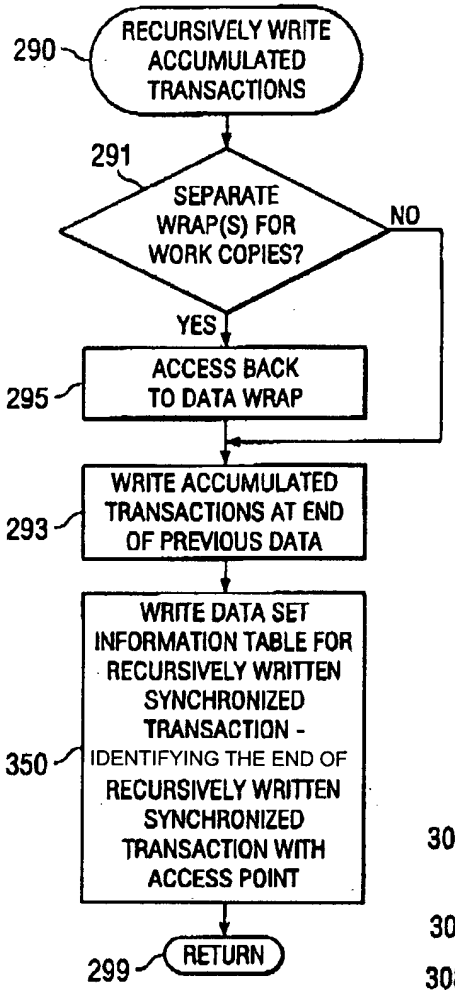


FIG. 11

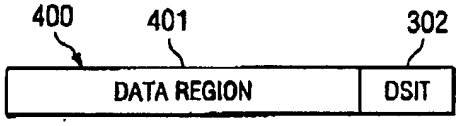


FIG. 12

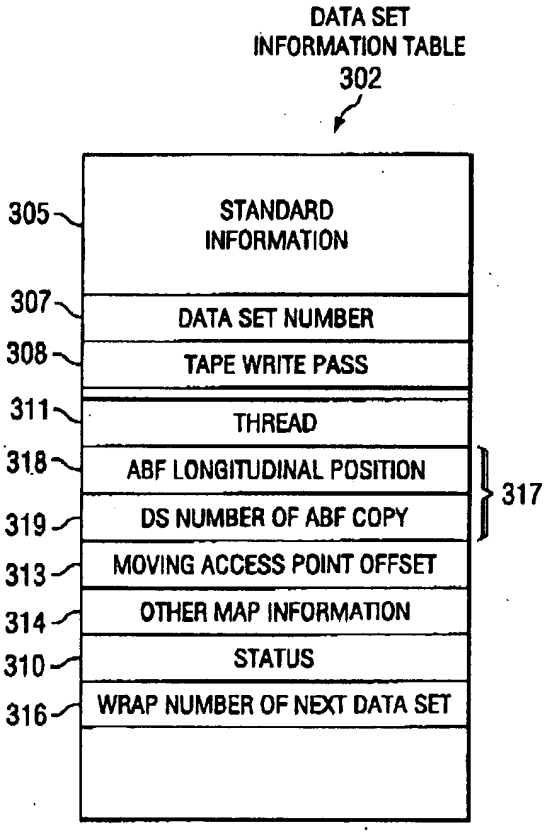


FIG. 13

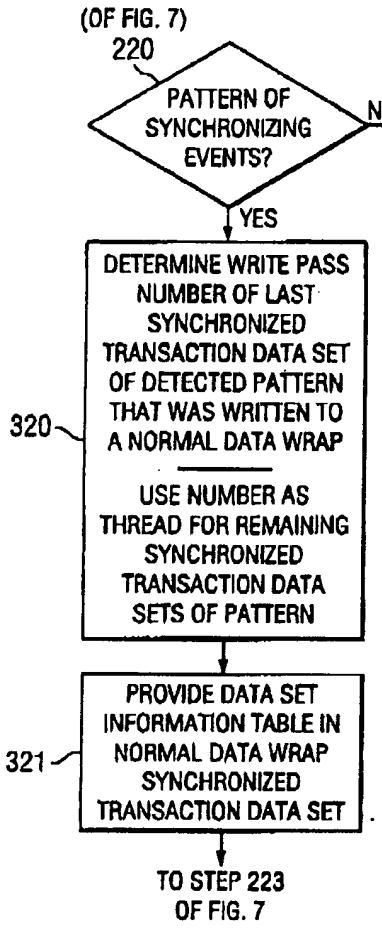

(OF FIG. 7)
220
PATTERN OF SYNCHRONIZING EVENTS?
NO
221
RETURN FOR NEXT COMMAND
YES
DETERMINE WRITE PASS NUMBER OF LAST SYNCHRONIZED TRANSACTION DATA SET OF DETECTED PATTERN THAT WAS WRITTEN TO A NORMAL DATA WRAP
320
USE NUMBER AS THREAD FOR REMAINING SYNCHRONIZED TRANSACTION DATA SETS OF PATTERN
PROVIDE DATA SET INFORMATION TABLE IN NORMAL DATA WRAP SYNCHRONIZED TRANSACTION DATA SET
321
TO STEP 223 OF FIG. 7

FIG. 14

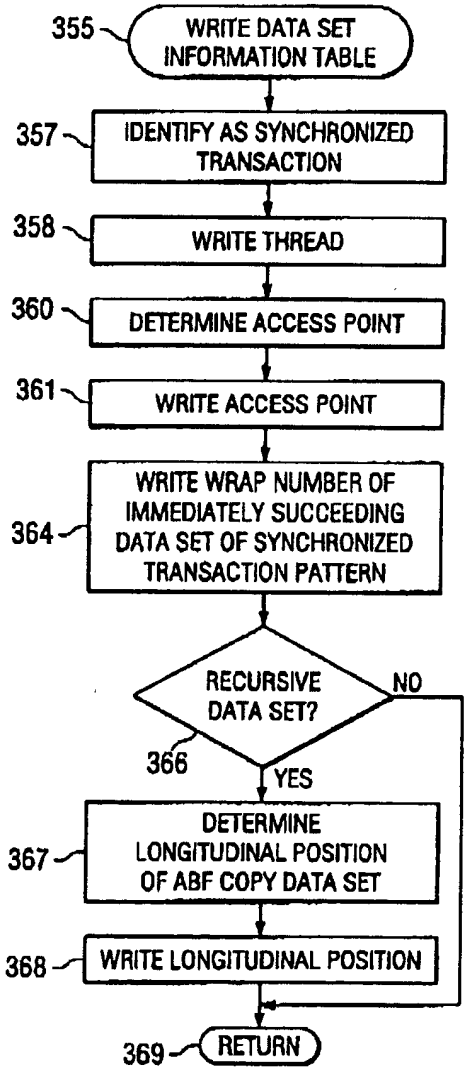

355
WRITE DATA SET INFORMATION TABLE
357
IDENTIFY AS SYNCHRONIZED TRANSACTION
358
WRITE THREAD
360
DETERMINE ACCESS POINT
361
WRITE ACCESS POINT
364
WRITE WRAP NUMBER OF IMMEDIATELY SUCCEEDING DATA SET OF SYNCHRONIZED TRANSACTION PATTERN
RECURSIVE DATA SET?
NO
366
YES
367
DETERMINE LONGITUDINAL POSITION OF ABF COPY DATA SET
368
WRITE LONGITUDINAL POSITION
369
RETURN

FIG. 15

FIG. 16

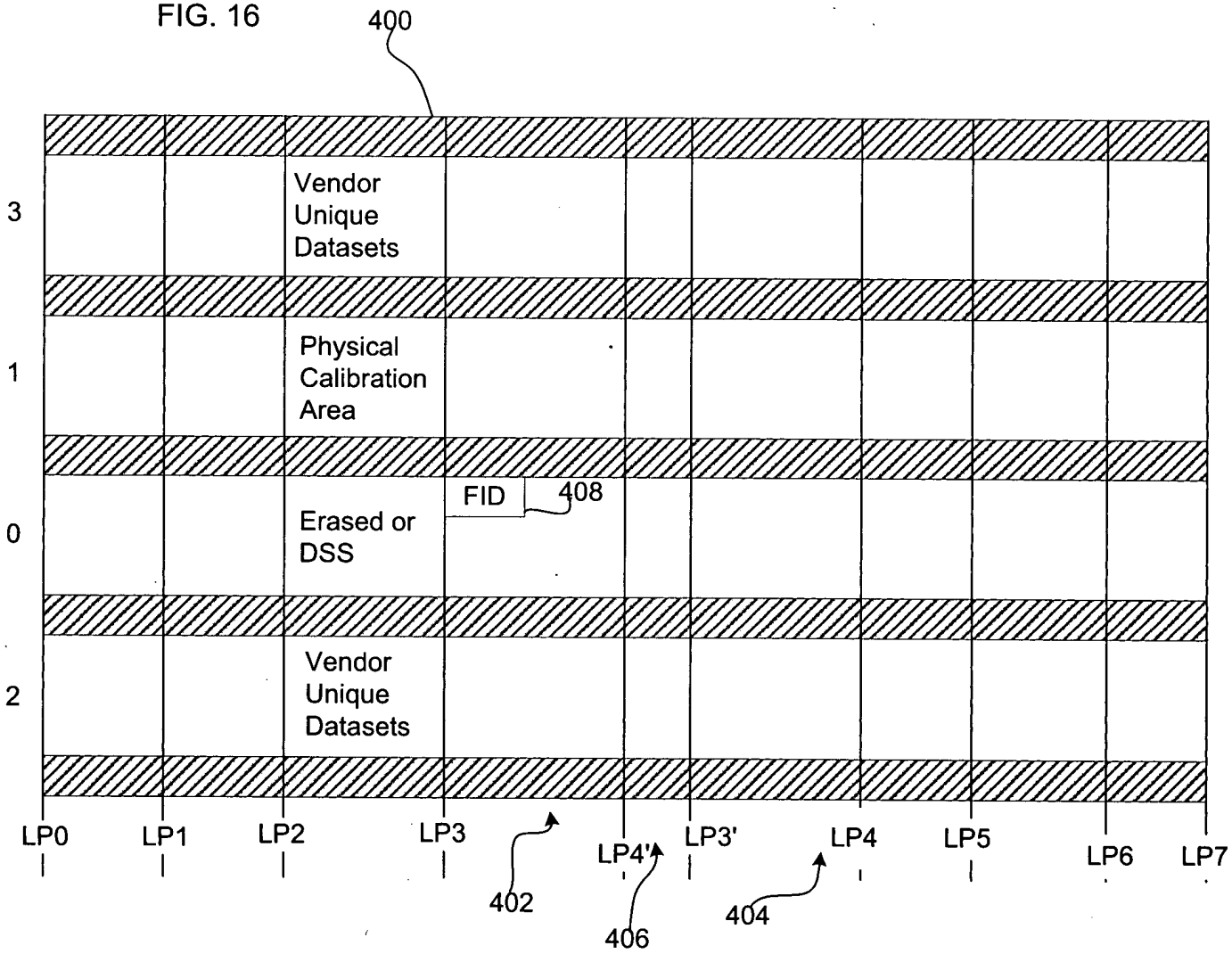

400
3
Vendor Unique Datasets
1
Physical Calibration Area
0
Erased or DSS
FID
408
2
Vendor Unique Datasets
LP0
LP1
LP2
LP3
LP4'
LP3'
LP4
LP5
LP6
LP7
402
404
406

FIG. 17

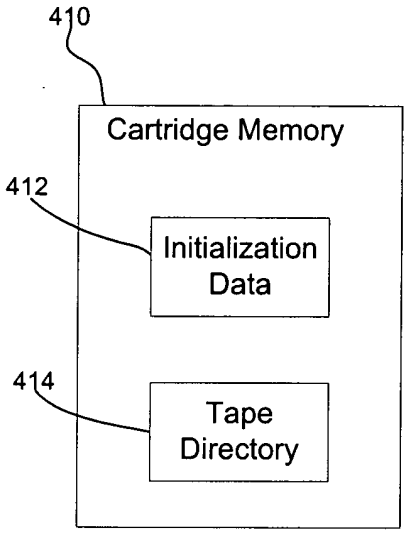

410
Cartridge Memory
412
Initialization Data
414
Tape Directory

FIG.18

Wrap Section	Begins	Ends	Direction
0	LP3	LP4'	Forward
1	LP4'	LP3	Backward
2	LP3	LP4'	Forward
3	LP4'	LP3	Backward
....	....	.....	.....
46	LP3	LP4'	Forward
47	LP4'	LP3	Backward
48	LP3'	LP4	Forward
49	LP4	LP3'	Backward
50	LP3'	LP4	Forward
51	LP4	LP3'	Backward
52	LP3'	LP4	Forward
...	....	....	....
94	LP3'	LP4	Forward
95	LP4	LP3'	Backward

FIG. 19

Wrap Section	Begins	Ends	Direction
0	LP3	LP4'	Forward
1	LP4'	LP3	Backward
2	LP3	LP4'	Forward
3	LP4'	LP3	Backward
....	....	.....	.....
46	LP3	LP4'	Forward
47	LP3'	LP4	Forward
48	LP4	LP3'	Backward
49	LP3'	LP4	Forward
50	LP4	LP3'	Backward
51	LP3'	LP4	Forward
52	LP4	LP3'	Backward
...	....	....	....
94	LP4	LP3'	Backward
95	LP4'	LP3	Backward

FIG. 20

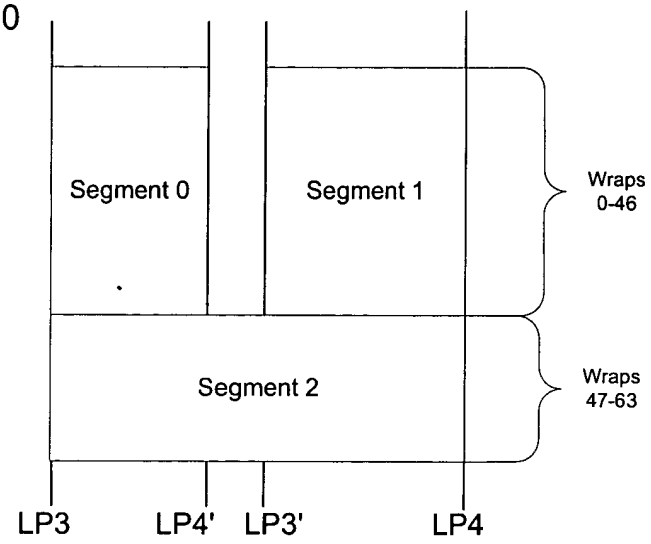

Segment 0
Segment 1
Wraps 0-46
Segment 2
Wraps 47-63
LP3
LP4'
LP3'
LP4

FIG. 21

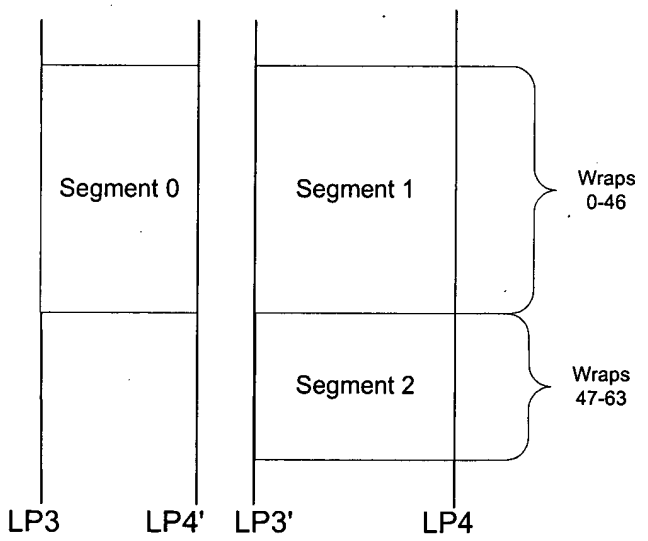

Segment 0
Segment 1
Wraps 0-46
Segment 2
Wraps 47-63
LP3
LP4'
LP3'
LP4

FIG. 22a

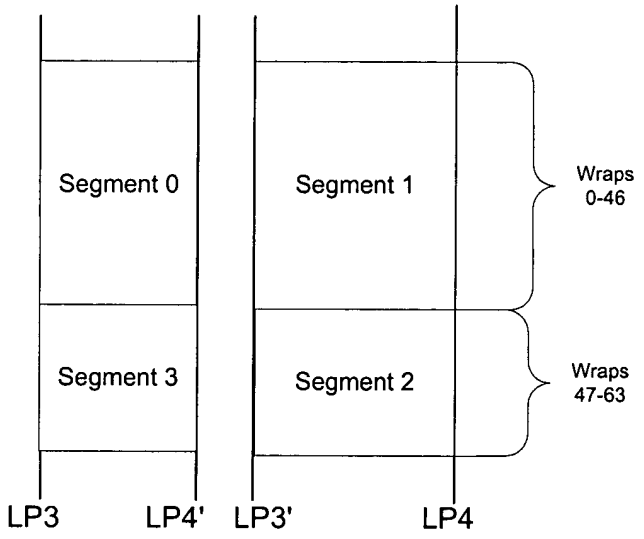


FIG. 22b

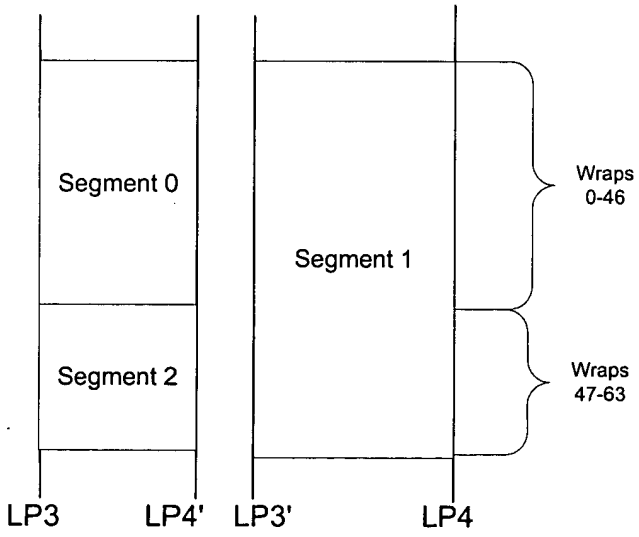


FIG. 23

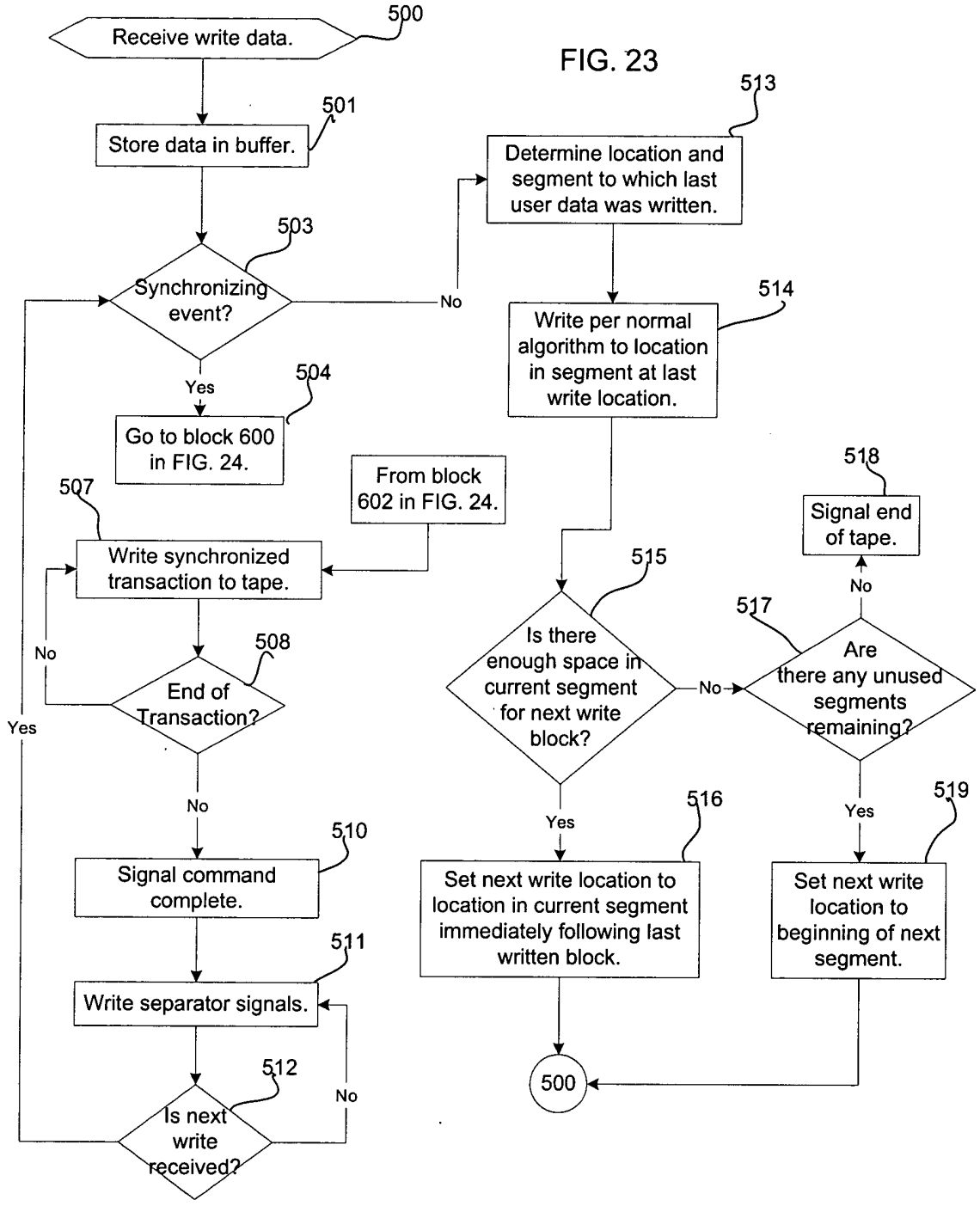
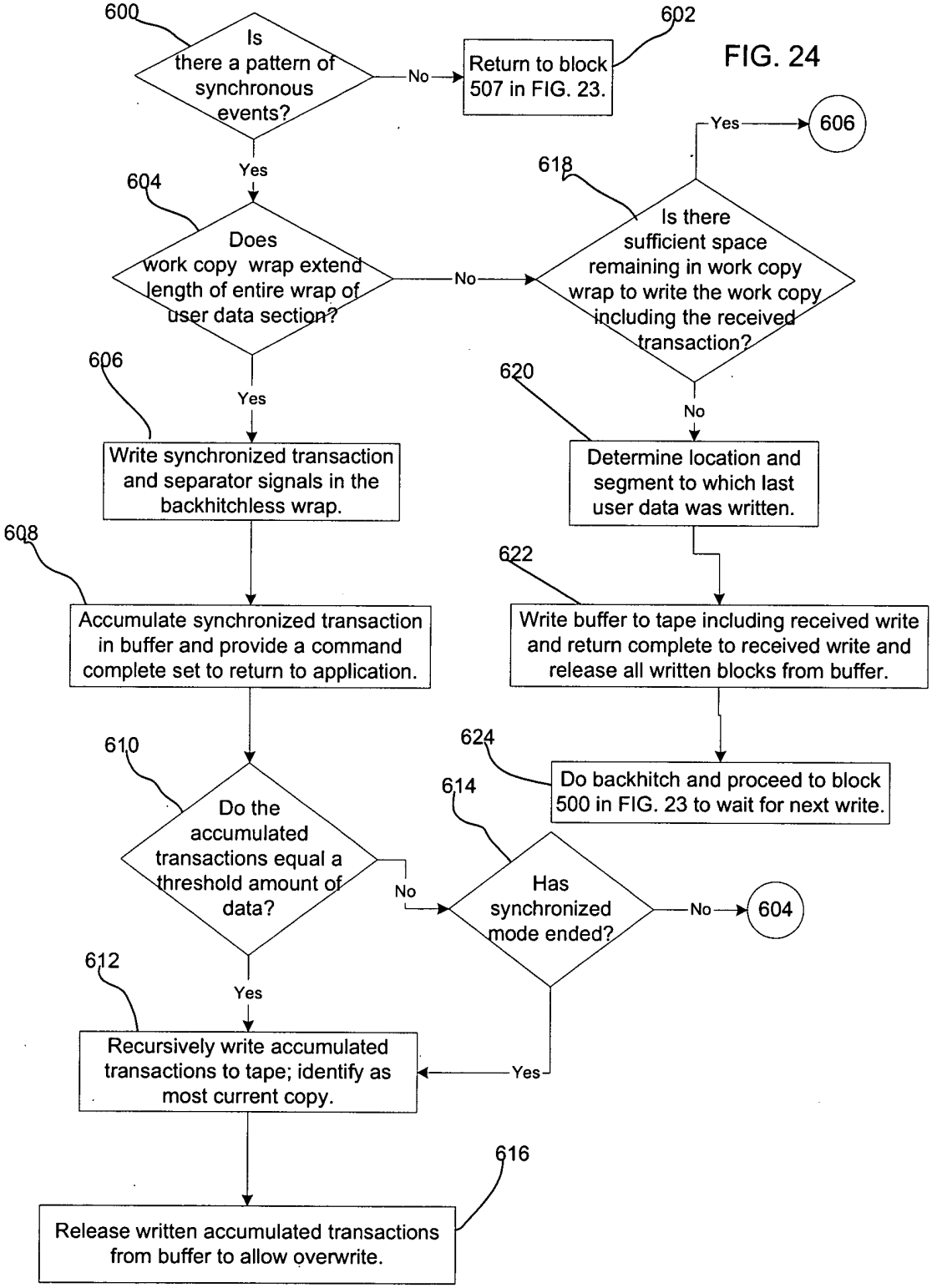

500
Receive write data.
501
Store data in buffer.
503
Synchronizing event?
No
Yes
504
Go to block 600 in FIG. 24.
507
Write synchronized transaction to tape.
508
End of Transaction?
No
Yes
No
510
Signal command complete.
511
Write separator signals.
512
Is next write received?
No
From block 602 in FIG. 24.
513
Determine location and segment to which last user data was written.
514
Write per normal algorithm to location in segment at last write location.
515
Is there enough space in current segment for next write block?
No
Yes
516
Set next write location to location in current segment immediately following last written block.
517
Are there any unused segments remaining?
No
Yes
518
Signal end of tape.
519
Set next write location to beginning of next segment.
500

FIG. 24


600
Is there a pattern of synchronous events?
No
602
Return to block 507 in FIG. 23.
Yes
606
Yes
604
Does work copy wrap extend length of entire wrap of user data section?
618
Is there sufficient space remaining in work copy wrap to write the work copy including the received transaction?
No
Yes
606
Write synchronized transaction and separator signals in the backhitchless wrap.
620
No
Determine location and segment to which last user data was written.
608
Accumulate synchronized transaction in buffer and provide a command complete set to return to application.
622
Write buffer to tape including received write and return complete to received write and release all written blocks from buffer.
610
Do the accumulated transactions equal a threshold amount of data?
624
Do backhitch and proceed to block 500 in FIG. 23 to wait for next write.
614
Has synchronized mode ended?
No
No
604
612
Yes
Recursively write accumulated transactions to tape; identify as most current copy.
Yes
616
Release written accumulated transactions from buffer to allow overwrite.

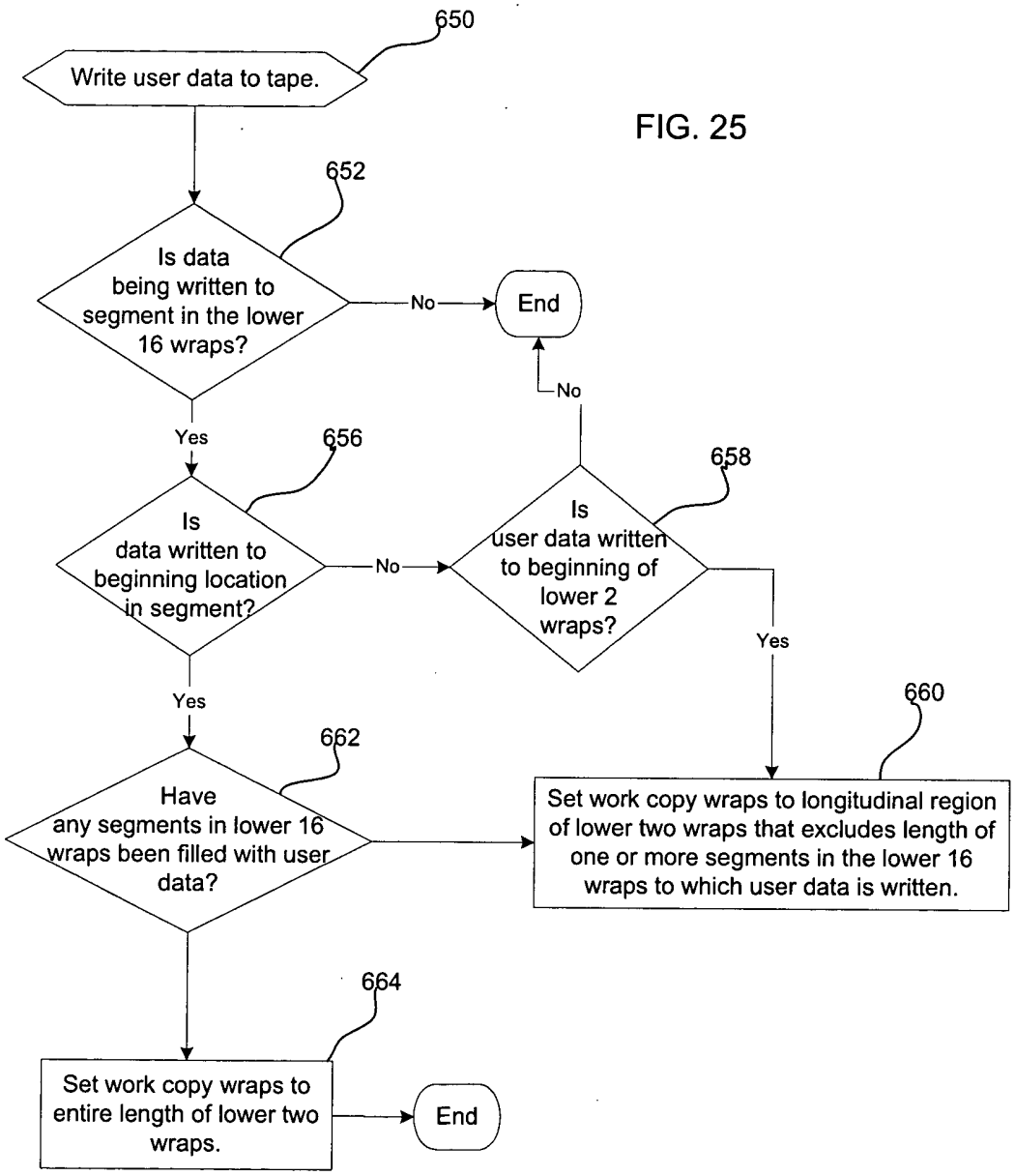

650
Write user data to tape.
652
Is data being written to segment in the lower 16 wraps?
No
End
Yes
656
Is data written to beginning location in segment?
No
658
Is user data written to beginning of lower 2 wraps?
No
Yes
Yes
660
Set work copy wraps to longitudinal region of lower two wraps that excludes length of one or more segments in the lower 16 wraps to which user data is written.
662
Have any segments in lower 16 wraps been filled with user data?
664
Set work copy wraps to entire length of lower two wraps.
End

FIG. 25